

SECTION 051810
DUCTWORK ERECTION

PART 1 – GENERAL

101. EXTENT
- 101.1 Ductwork erection shall conform to the requirements as indicated on the CONTRACTOR's shop, erection and Design Drawings and to the requirements specified herein. The erection of the doors and expansion joints shall be per manufacturers' written instructions and applicable project specifications.
- 101.2 The Work shall include unloading, storing and erecting all ductwork and associated materials unless otherwise noted.
- 101.3 The Work includes installation of the following:
- a. Ductwork.
 - b. Expansion joints and support frames.
 - c. Sliding bearing plates, anchor plates, guide bars, and leveling shims.
 - d. Ductwork Appurtenances:
 - d1. Access doors.
 - d2. Turning vanes and splitter plates.
 - d3. Bracing and stiffeners.
 - d4. Instrument connections.
 - d5. Instrument probe supports.
- 101.4 In addition to those materials/components identified above, the following Work shall be performed/provided:
- a. Furnishing welding electrodes and performing field welding and bolting as required.
 - b. Field touch-up coating Work
 - c. Removal of any lifting lugs or shipping braces installed on individual duct panels or sections by the fabricator for shipping to the site.
 - d. Design, supply, installation and removal of all lifting lugs and temporary bracing used for lifting completed duct sections onto the support structure.
- 101.5 Ductwork erection Work shall include all cleaning (internal as well as external), adjusting, lubricating, and testing required to place the ductwork and Equipment in service.
- 101.6 Where the services of a manufacturer's representative are utilized for certain Equipment, the representative will advise the CONTRACTOR of the proper procedure to be used for unloading,

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- handling, erection, and startup of the manufacturer's Equipment. Appropriate service time shall be included to support the manufacturer's representative for this purpose.
- 101.7 The ductwork erection Work shall be subject to inspection and acceptance by the DISTRICT's representative. In addition, the Work will be subject to inspection and acceptance of manufacturer's representative where the services of such a representative are utilized.
102. REFERENCE DOCUMENTS
- 102.1 Related standard specifications are referenced in this Section. The Work performed shall comply with the referenced and applicable requirements of the latest issue date of these documents, in addition to Federal, State or local codes having jurisdiction. Reference to these documents shall be to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of the Contract for the Work.
- 102.2 AISC - American Institute of Steel Construction:
- a. 303 - Code of Standards Practice for Steel Buildings and Bridges.
 - b. 316 - Manual of Steel Construction, 13th Edition.
 - c. 360 - Specification for Structural Steel Buildings.
- 102.3 FRP Ductwork
- a. ASME RTP-1, Reinforced Thermoset Plastic Corrosion Resistant Equipment
 - b. ASME B&PV Section X, Fiber-Reinforced Plastic Pressure Vessels
- 102.4 AWS - American Welding Society:
- a. A2.4 - Standard Welding Terms and Definitions
 - b. A3.0 - Welding Terms and Definitions.
 - c. A5.1 to A5.29 - Specification for Welding Electrodes.
 - d. A6.1 - Recommended Safe Practice for Gas-Shielded Arc-Welding.
 - e. D1.1 - Structural Welding Code - Steel.
- 102.5 ASME - American Society of Mechanical Engineers:
- a. Section V - Nondestructive Examination.
- 102.6 ASTM - ASTM International:
- a. E 165 - Practice for Liquid Penetrant Inspection Method.
103. QUALITY ASSURANCE
- 103.1 Quality Assurance/Quality Control shall be in accordance with the following:
- a. AISC Code of Standard Practice for Steel Buildings and Bridges

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- b. Fabrication, dimensional tolerances, inspection and testing of FRP ductwork shall be in accordance with ASME RTP-1 or ASME B&PV Section X and other applicable USA industry standards.
- c. CONTRACTOR may elect to specify more restrictive requirements. If dimensional tolerances, inspection and testing requirements are not specified in the above standards, CONTRACTOR shall determine same. Dimensional tolerances, inspection and testing requirements shall be specified in CONTRACTOR's shop and field QA/QC procedures and submitted to DISTRICT and the DISTRICT's engineer for review prior to the start of fabrication.

- d. QA/QC Project Procedures.

103.2 Quality Control:

- a. All inspections and tests required by this specification or by the referenced documents are the responsibility of the CONTRACTOR. Nonconformances shall be documented in detail and promptly submitted to the DISTRICT and CONTRACTOR's Engineer for review and resolution.
- b. Errors in shop fabrication which prevent proper field assembly and fit up shall be reported, as soon as they are discovered to the DISTRICT.

103.3 Welding:

- a. Quality Assurance requirements for welding are specified in Section 050525.
- b. Seal welds shall be examined 100% using the liquid penetrant inspection method per ASTM E 165 and Section 6 of AWS D1.1 or in accordance with the requirements of ASME Section V, Article 10 using the vacuum box inspection method.
- c. CONTRACTOR shall correct and/or repair all leakage in the ductwork due to faulty fabrication and erection Work.
- d. Quality Assurance requirements for bolting are specified in Section 050523.

PART 2 – PRODUCTS

201. MATERIALS

- 201.1 Materials shall be per Section 051800.

PART 3 - EXECUTION

301. ERECTION

- 301.1 Conform to the requirements of AISC Code of Standard Practice, other referenced publications and standards, as indicated on the CONTRACTOR's design and erection Drawings, and as specified herein.
- 301.2 All field connections shall be welded, unless noted at connections to Equipment, expansion joints, or at other places where the CONTRACTOR's Drawings indicate a flanged, gasketed, and bolted joint.
- 301.3 Structural members serving as connecting flanges to Equipment, expansion joints, etc., shall be tack welded to the plate. After the duct is installed and aligned, the flanges shall be adjusted as necessary to assure the expansion joint width is as specified and the flanges to Equipment, expansion joints, etc., are

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- perpendicular to the ducts and vertically plumb within the tolerances specified, and permanently welded to the plate.
- 301.4 Remove temporary shipping and erection supports, braces, hangers, etc., after erection.
- 301.5 Ducts shall be leveled and set to design elevations using full contact shims under the base or sole plates. Shims under sliding bearing plates shall be in full contact with the sole plate and sliding bearing plate. Sliding bearing plates shall be installed in accordance with the manufacturer's recommendations.
- 301.6 Seal welds shall be on the inside of the ductwork.
- 301.7 High-Strength Bolting: Conform to the requirements of Section 050523.
- 301.8 CONTRACTOR shall make up all joints connecting to Work by Others or in place; this shall include furnishing all necessary Equipment, labor, welding materials and other materials required for such joints.
302. DUCT SUPPORTS
- 302.1 Ducts shall be supported from steel, erected to tolerances complying with the AISC code, or from the absorber vessel. Before duct erection begins, CONTRACTOR shall establish that the line and elevation are within tolerance at the ductwork support areas. Measurements will be witnessed by DISTRICT.
- 302.2 Ductwork supports not within tolerance shall be corrected by a method acceptable to the DISTRICT's Field Representative and the CONTRACTOR's Engineer before commencement of ductwork erection Work.
- 302.3 Records of the measurements taken shall be kept both before and after corrective measures are taken. Results shall be accepted by the CONTRACTOR and DISTRICT, and copies given to each party.
- 302.4 Ducts which are designed to be held in place with uplift retainers shall not be left in place without uplift retainers or other suitable hold down devices.
303. ERECTION OF EXPANSION JOINT ASSEMBLY
- 303.1 Installation shall conform to the requirements specified by the manufacturer, as indicated on CONTRACTOR's shop and Design Drawings and to the requirements specified herein.
- 303.2 For protection of the fabric during erection and welding, a protecting metal sheet or foil covering, or equal, shall be provided. This covering shall be removed prior to startup.
- 303.3 To prevent damage to the expansion joint material due to heat conduction from the studs and backup bars during stitch welding, insulating tape, washers, bushings or equal means for temperature isolation and protection shall be provided.
- 303.4 Internal flow baffles shall be installed after expansion joint assemblies have been installed, using a welding blanket to protect the joint fabric.
- 303.5 To ensure that the expansion joints are installed in the correct configuration dictated by the baffle arrangement or offset, clearly mark the gas flow direction on the protective metal sheet or foil.

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304. TOLERANCES

304.1 Erection Tolerances: The proper location of support points and squareness of the duct connecting flanges at Equipment connections, and expansion joints, is of the utmost importance in assuring the ductwork will fit properly and have the calculated thermal movements. Therefore, the erected duct shall meet the erection tolerances as listed in the AISC Code of Standard Practice unless otherwise specified on the CONTRACTOR's Design Drawings and herein.

304.2 In addition to the AISC Code requirements, ductwork fabrication and erection tolerances shall be as given in Specification Section 051800.

304.3 Sliding Bearing Plate Tolerance: The installed portion of the bottom plate of the extended ductwork stiffener and the top surface of the lubricated sliding surface shall be parallel within 0.5 degree, not to exceed 1/32 inch over the width or length of the bearing contract area.

305. FIELD CLEANING AND COATING WORK

305.1 Touch up shop coated surfaces according to the requirements of Section 099113.

305.2 Unless noted on the CONTRACTOR's design drawings, the extent of coating work shall be all carbon steel components projecting outside of the ductwork insulation and lagging. Paint shall extend inboard of the lagging back to the face of the ductwork stiffeners.

306. ERECTION OF ROUND CROSS-SECTION DUCTWORK

306.1 The erection of round cross-section ductwork and internals shall follow the same specification requirements as defined herein for flue gas ductwork. Erection tolerances and fabrication requirements shall be as given in Section 051800.

307. ERECTION OF HASTELLOY C276 AND OTHER STAINLESS STEEL DUCTWORK

307.1 The erection of ductwork made from/with Hastelloy C276 or other stainless steel shall be per the stainless steel manufacturer's requirements and the requirements herein. General erection requirements for flue gas ductwork erection shall apply. Welding filler material is covered in fabrication specification Section 051800.

END OF SECTION 051810

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